**DETAILED ACTION**

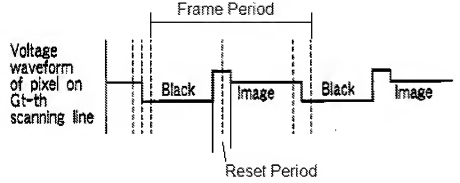
1. In an amendment dated, January 13th, 2010, the Applicants amended claims 1 and 8. Currently claims 1, 3-8 and 10-20 are pending.

***Response to Arguments***

2. Applicant's arguments filed January 13th, 2010 have been fully considered but they are not persuasive.

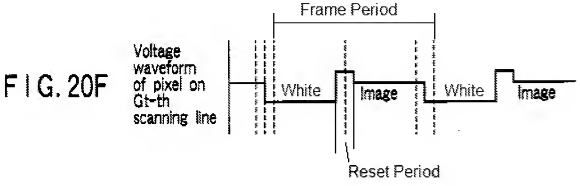
On page 8 of the Remarks, the Applicants argue that Baba discloses a sequence of black|image|reset. The Examiner has included below a marked up copy of Baba's figure 20F. It should be clear from this waveform that the actual sequence in fig. 20F is black|reset (white)|image.

FIG. 20F

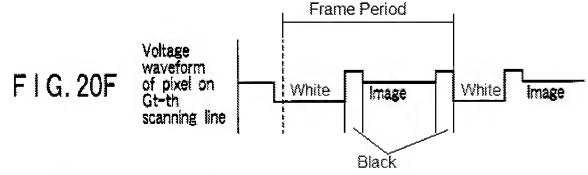



Before continuing, it might be best to present the proposed combination of Baba and Sato. As previously noted, Baba discloses that this driving scheme is applicable to both normally black and normally white displays (col. 13, lines 39-41). Likewise, Sato discloses that normally white display is preferred over normally black displays (col. 17, lines 28-33). Upon switching to a normally white display the waveform would result in a

waveform sequence of white|reset(black)|image. An updated driving waveform is shown below.




Also considered in the combination of Sato with Baba is the inclusion of a second no-light period after the image within the same frame period. Sato discloses a first non-display period (Ta– Tb in fig. 11d) and a second non-display period (Tc1 – Tc2 in fig. 11d). Upon inserting a second non-display period the Baba waveform would look similar to the modified waveform below.




With this proposed combination of Sato and Baba, we return to the presented arguments.

On pages 8-9 the Applicants argue that Baba does not teach regulating a brightness of a display by controlling a duration of the white light display period.

While the Examiner agrees that Baba does not disclose a variable duration of the reset period, Baba is still seen as disclosing the simple act of regulating brightness. To further explain, the driver of Baba without question controls the duration of the reset period. It is incumbent upon the driver in Baba to supply control signals to initiate and end the application of the reset pulse to the data lines of the display. Furthermore while the main thrust of including the reset period, as noted by the Applicants, is to improve the response speed of the liquid crystal, this improvement will directly affect the brightness of the display. For example, without the reset period, the pixel will be slower to reach a brightness level desired by the image data. Increase in response speed therefore results in a more accurate brightness level being presented to the user. This is seen as being sufficient to meet the current claims limitations which merely require to "regulate a brightness."

Applicants also argue on page 9, that Baba does not disclose, "a frame of an image driven by the driver being displayed on the LCD." Applicants make a distinction between a scanning line and a display.

The Examiner respectfully disagrees. The waveform of a pixel on a scanning line is part of the LCD. Any display of black, white or images is therefore being displayed on the LCD.

On page 10 of the Remarks, the Applicants argue that Sato is merely disclosing causing light emitting diodes to turn on and off.

The Examiner respectfully disagrees. Sato discloses at least two no-light periods during a frame of the display. It is for this additional no-light period that Sato is combined with Baba, and not the teaching of regulating brightness.

The remaining pages of the Remarks restate arguments which are refuted above. As such the rejections are seen as proper. The rejections have been updated to reflect the newly added limitations, but are otherwise maintained.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 8, 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. (US 7,106,350) in view of Sato et al. (US 7,030,848).

**With respect to claim 1,** Baba discloses, a normally black (note the voltage waveforms in fig. 20f; col. 13, lines 43-62) liquid crystal display (LCD) (21 in fig. 26), comprising:

an LCD panel producing a colored display (col. 3, lines 17-19); and

a driver for driving the LCD panel (signal and scanning driver in fig. 26), wherein

a frame of an image being driven by the driver and being displayed by the LCD (frame in figs. 20A-F) includes:

a display period during which the driver drives the LCD panel to display a desired color by mixing a combination of light output by the plurality of colors (image period of fig. 20f), and

a first non-display period (black period and reset period in fig. 20f within the frame period) including a white light display period (reset period in fig. 20f; col. 16, lines 23-25) and a first no-light display period (black in fig. 20f) during which the driver drives the LCD panel to display white light (col. 16, lines 23-25) during the white light display period then no light (black in fig. 20f) during the first no-light display period at a different and distinct time period than the white light display period of the first non-display period (fig. 20f); and

a second non-display period (end of frame period on fig. 20f) during which the driver drives the LCD panel to display no light (end of 20f frame is black),

the driver is configured to regulate a luminance of the display by controlling a ratio of a duration of the display period to a duration of the first no-light period (fig. 26; col. 3, lines 42-47, for example),

the driver is configured to regulate a brightness of the display by controlling a duration of the white light display period (fig. 20f; furthermore Baba inherently controls the duration of the white light display period by describing a specific time period during which white light is displayed),

wherein the first no-light display period (black in fig. 20f), the white light display period (reset period in fig. 20f) and the display period (image in fig. 20f) are sequentially disposed in each frame of the image (fig. 20f).

Baba further discloses that this driving scheme is applicable to both normally black and normally white displays (col. 13, lines 39-41).

Baba does not expressly disclose, that colors are displayed by color filters or that the first no-light display period occurs after the white light display period.

Sato discloses a LCD comprising:

an LCD panel having a plurality of color filters to selectively filter white light (col. 42, lines 28-32); and

a first non-display period (Ta– Tb in fig. 11d) and a second non-display period (Tc1 – Tc2 in fig. 11d) including a second no-light display period (Tc1 – Tc2 in fig. 11d) during which the driver drives the LCD panel to display no light (clear from fig. 11d that no light is displayed during the period; also note col. 17, lines 17-33),

a driver (34-35 in fig. 4) is configured to regulate luminance of the display by controlling a ratio of a duration of the display period to a duration of the first and second no-light display periods (col. 12, line 58 – col. 13, line 50, describes how the driver regulates and controls the above claimed ratio. furthermore Sato inherently controls the ratio by disclosing specific time periods for the display period and first and second no-light periods).

Sato also discloses, that normally white display is preferred over normally black displays (col. 17, lines 28-33).

Baba and Sato are analogous art because they are both from the same field of endeavor namely, LCD display control schemes.

At the time of the invention it would have obvious to replace the normally black display of Baba with the normally white display of Sato, as well as to include the second no-light display period and color filters of Sato in the display of Baba.

The motivation for using normally white liquid crystal being the well known benefit of higher color purity and brightness. Motivation for adding the additional no-light display period being to reduce the response period of the liquid crystal and thereby increase display quality (Sato; col. 17, lines 34-37).

It should be clear that upon the changing to normally-white liquid crystal, the low voltage applied to the LCD of Baba will generate a white display and the reset signal afterwards would result in a black period. As such Baba, as modified by Sato, discloses that the no-light period occurs after the white light display period.

**With respect to claim 8,** Baba discloses, a method for driving a liquid crystal display (LCD) including an LCD panel (fig. 33) having a plurality of colors (col. 3, lines 17-19), the method comprising:

during a frame of an image to be displayed (fig. 20f; frame period):

driving the LCD panel during a display period (image in fig. 20f) to display a desired color (fig. 20f; image period); and

driving the LCD panel during a first non-display period (black period and reset period in fig. 20f within the frame period) including a first no-light display period (black in fig. 20f) and a white light display period (reset period in fig. 20f) to display white light during the white light display period (col. 16, lines 23-25) and no light during the first no-light display period (black in fig. 20f), and during a second non-display period (end of

frame period on fig. 20f) including a second no-light display period (end of 20f frame is black);

the driver is configured to regulate a luminance of the display by controlling a ratio of a duration of the display period to a duration of the first no-light period and color hold periods (fig. 26; col. 3, lines 42-47, for example),

the driver is configured to regulate a brightness of the display by controlling a duration of the white light display period (fig. 20f; furthermore Baba inherently controls the duration of the white light display period by describing a specific time period during which white light is displayed),

wherein the first no-light display period (black in fig. 20f), the white light display period (reset period in fig. 20f) and the display period (image in fig. 20f) are sequentially disposed in each frame of the image (fig. 20f).

Baba further discloses that this driving scheme is applicable to both normally black and normally white displays (col. 13, lines 39-41).

Baba does not expressly disclose, that colors are displayed by color filters or that the first no-light display period occurs after the white light display period.

Sato discloses a LCD comprising:

an LCD panel having a plurality of color filters to selectively filter white light (col. 42, lines 28-32); and

a first non-display period (Ta – Tb in fig. 11d) and a second non-display period (Tc1 – Tc2 in fig. 11d) including a second no-light display period (Tc1 – Tc2 in fig. 11d)

during which the driver drives the LCD panel to display no light (clear from fig. 11d that no light is displayed during the period; also note col. 17, lines 17-33),

a driver (34-35 in fig. 4) is configured to regulate luminance of the display by controlling a ratio of a duration of the display period to a duration of the first and second no-light display periods (col. 12, line 58 – col. 13, line 50, describes how the driver regulates and controls the above claimed ratio. furthermore Sato inherently controls the ratio by disclosing specific time periods for the display period and first and second no-light periods).

Sato also discloses, that normally white display is preferred over normally black displays (col. 17, lines 28-33).

At the time of the invention it would have obvious to replace the normally black display of Baba with the normally white display of Sato, as well as to include the second no-light display period of Sato in the display of Baba.

The motivation for using normally white liquid crystal being the well known benefit of higher color purity and brightness. Motivation for adding the additional no-light display period being to reduce the response period of the liquid crystal and thereby increase display quality (Sato; col. 17, lines 34-37).

It should be clear that upon the changing to normally-white, the low voltage applied to the LCD of Baba will generate a white display and the reset period afterwards results in a black period. As such Baba, as modified by Sato, discloses that the no-light period occurs after the white light display period.

**With respect to claims 12-13,** Baba and Sato disclose, the LCD according to claims 1 and 8 (see above).

Baba, when combined with Sato further discloses, wherein the LCD panel is driven to display no light during each non-display period between each of the display periods (Baba; seems clear from fig. 20f that black is displayed between image displays) during which the desired color formed by mixing a combination of light output by the plurality of color filters is displayed (Baba; discloses the color display in fig. 20f; Sato as shown above discloses the use of color filters to achieve color displays).

**With respect to claim 14,** Baba and Sato disclose, the LCD as claimed in claim 1 (see above).

Baba, as modified by Sato, further discloses, wherein during the first non-display period, the driver drives the LCD panel to display no light immediately after driving the LCD panel to display white light (as discussed above upon the combination of Baba with Sato and the switch to a normally white display, Baba would still achieve all the benefits of the invention, the only difference being that the white period would occur prior to the black period).

**With respect to claim 15,** Baba and Sato disclose, the LCD as claimed in claim 14 (see above).

Baba further discloses, wherein the display period of the frame follows the first non-display period of the frame (clear from fig. 20f).

**With respect to claim 16,** Baba and Sato disclose, the LCD as claimed in claim 15 (see above).

Baba, when combined with Sato, further discloses, wherein the display period occurs between the first no-light display period and the second no-light display period (clear from fig. 11d of Sato; as well as fig. 20f of Baba).

To further explain, Baba's original waveform is black|white|color|black|repeat. Sato's normally white display and second non-display period is black|color|black|repeat. Upon combination the Baba waveform becomes, white|black|color|black|repeat.

**With respect to claim 17,** Baba and Sato disclose, the method as claimed in claim 8 (see above).

Baba, as modified by Sato, further discloses, wherein during the first non-display period, the driver drives the LCD panel to display no light immediately after driving the LCD panel to display white light (as discussed above in the combination of Baba with Sato in a switch to a normally white display, Baba would still achieve all the benefits of the invention, the only difference being that the white period would occur prior to the black period).

**With respect to claim 18,** Baba and Sato disclose, the method as claimed in claim 8 (see above).

Baba further discloses, wherein the display period of the frame follows the first non-display period of the frame (clear from fig. 20f).

**With respect to claim 19,** Baba and Sato disclose, the method as claimed in claim 8 (see above).

Baba, when combined with Sato, further discloses, driving the LCD panel so as to drive the display period between the first no-light display period and the second no-light display period (clear from fig. 11d of Sato; as well as fig. 20f of Baba).

To further explain, Baba's original waveform is black|white|color|black|repeat. Sato's normally white display and second non-display period is black|color|black|repeat. Upon combination the Baba waveform becomes, white|black|color|black|repeat.

**With respect to claim 20,** Baba and Sato disclose, the method as claimed in claim 19 (see above).

Baba, modified by Sato, further discloses, wherein the LCD panel is driven such that a white light display period of a subsequent frame occurs after the second no-light display period of the previous frame and before a no-light period of the subsequent frame (as discussed above, upon the combination of Baba with Sato, black adjustment data would be included and, the waveform would appear, [[ white|black|color|black ]] [[ white|black|color|black ]] ).

5. Claims 3-5, 7, and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable Baba et al. (US 7,106,350) in view of Sato et al. (US 7,030,848) and further in view of Iwauchi (US 5,843,492).

**With respect to claim 3**, Baba and Sato disclose, the LCD according to claim 1 (see above).

Neither Baba nor Sato expressly disclose, wherein the plurality of color filters are transmissive color filters attached to an upper portion of the LCD panel.

Iwauchi discloses, a plurality of transmissive color filters (6 in fig. 1) attached to an upper portion of the LCD panel (8 in fig. 1, also note col. 13, lines 63-67 and col. 14, lines 1-12).

Sato, Baba and Iwauchi are analogous art because they are from the same field of endeavor namely, filter TFT LCD panels.

At the time of the invention it would have been obvious to one of ordinary skill in the art to construct the filters of Baba and Sato as shown by Iwauchi's upper portion transmissive color filters.

The motivation for doing so would have been to achieve a brighter multi-color display (Iwauchi; col. 3, lines 65-67).

**With respect to claim 4,** Baba, Sato and Iwauchi disclose, the LCD according to claim 3 (see above).

Neither Baba nor Sato expressly disclose, a reflecting plate.

Iwauchi further discloses, a reflecting plate (16 in fig. 2a, col. 7, lines 15-17).

At the time of the invention it would have been obvious to one of ordinary skill in the art to include a reflecting plate, taught by Iwauchi, in the LCD panel disclosed by Baba and Sato.

The motivation for doing so would have been to lower power consumption by removing the need for a backlight to illuminate the panel.

**With respect to claim 5**, Baba and Sato disclose, the LCD according to claim 1 (see above).

Neither Baba nor Sato expressly disclose, wherein the color filters are reflective and attached to the lower portion of the LCD panel.

Iwauchi discloses, reflective color filters attached to the lower portion of the LCD panel (21(a,b,c) in fig. 6, col. 14, lines 25-28)

At the time of the invention it would have been obvious to one of ordinary skill in the art to include reflective color filters as disclosed by Iwauchi, in the LCD panel of Baba and Sato.

The motivation for doing so would have been to remove the need for a reflecting plate in panel.

**With respect to claim 7,** Baba, Sato and Iwauchi disclose, the LCD according to claim 5 (see above).

Iwauchi further discloses, wherein the plurality of color filters of the reflective color filter are made of dielectrics having different indices of refraction (While Iwauchi's embodiments use cyan, magenta, and yellow there is no reason one couldn't create the same filter using red, green, and blue. Col. 14, lines 36-45).

**With respect to claim 10,** as claim 10 is merely a method statement of the above limitations of claim 3, claim 10 is rejected on the same merits as shown above.

**With respect to claim 11,** as claim 11 is merely a method statement of the above limitations of claim 5, claim 11 is rejected on the same merits as shown above.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. (US 7,106,350) in view of Sato et al. (US 7,030,848) in view of Iwauchi (US 5,841,492) and further in view of Alvarez (US 5,131,736).

**With respect to claim 6**, Baba, Sato and Iwauchi disclose, the LCD according to claim 5 (see above).

Neither Baba, Sato nor Iwauchi expressly disclose wherein the plurality of color filters are made of photonic crystals, which are alternate arrays of dielectrics.

Alvarez discloses, a filter constructed of alternate arrays of dielectrics (col. 3, lines 27-45).

Baba, Sato, Iwauchi, and Alvarez are all analogous art because they are directed to a similar problem solving area, namely filtering white light efficiently.

At the time of the invention it would have been obvious to one of ordinary skill in the art to use the dielectric array of Alvarez in place of the dielectric mirror of Iwauchi, Sato and Baba.

The motivation for doing so would have been for the higher efficiency of the dielectric array (Alvarez, col. 1, lines 21-25).

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM L. BODDIE whose telephone number is (571)272-0666. The examiner can normally be reached on Monday through Friday, 7:30 - 4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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